

REMARKS

Claims 1 - 12 remain active in this application. Amendment of claims 2, 3, 8 and 9 has been requested to provide consistent hyphenation in the claims. No new matter has been introduced into the application.

Claims 6 and 7 have been rejected under 35 U.S.C. §102 as being anticipated by Hibbs et al. (hereinafter "Hibbs") or Sussmeier, claims 1 - 7 have been rejected under 35 U.S.C. §103 as being unpatentable over Harshbarger, Jr., et al. (hereinafter "Harshbarger") and claims 8 - 12 have been rejected under 35 U.S.C. §103 as being unpatentable over Sussmeier in view of Neyman. These grounds of rejection are respectfully traversed for the reasons previously presented, which are hereby fully incorporated by reference, and the further remarks provided below.

The Examiner's attention is respectfully called to page 11, line 15, to page 12, line 22, for a concise description of the operation and principles of the invention and to page 11, lines 31 - 36, in particular, which state:

"In other words, the Moire' pattern as produced in accordance with the invention may be considered as a beating of different spatial frequencies with the frequency of the beating diminishing with diminishing difference of spatial frequency."

In accordance with the invention, a Moire' pattern is developed in accordance with a difference of spatial frequency of image features in respective sub-fields of the imaged target as projected onto the image plane of the image capture device and the spatial frequency of the individual sensor areas (pixels) of the imaging device (e.g. a two-dimensional charge coupled device); the latter limiting the resolution of the image capture device. When the range of spatial frequencies of

features of respective sub-fields of the target, as referred to the image plane, encompasses (e.g. includes pitches/spatial frequencies of features both greater than and less than the pitch/spatial frequency of the sensors/pixels, a Moire' pattern will be produced in each imaged sub-field unless the spatial frequency of the features of the sub-field match the spatial frequency of the sensors/pixels. Moreover, the size and frequency of the Moire' fringes in each sub-field will lead the eye of a person inspecting the image of the target to the sub-field in which Moire' fringes are minimized or absent altogether, particularly where the size and pitch of features in the respective sub-fields form a progression which encompasses the resolution of the image capture device, thus not only allowing but facilitating a determination of resolution of an imaging device or system by simple direct inspection of the image produced/captured.

Therefore, it is respectfully submitted that the features of the invention sufficient to support this function and distinguish the invention from the prior art are 1.) that a *plurality of sub-fields* be imaged from a target and 2.) that the respective sub-fields present a *progression of image feature size and pitch*, referred to the image plane of the image capture device, which *encompasses* the resolution of the image capture device.

These features are clearly recited in all claims of the application but are not all present in any of the references applied or taught or suggested by combinations of the prior art applied under any consistent interpretation or evaluation thereof. Further, as will be demonstrated, any evaluation or interpretation of the references which the Examiner may be making (and which is not at all clear from the statements of any of the various grounds of rejection) necessarily relies on inconsistency of the evaluation

or interpretation made by the Examiner of the references applied.

Specifically, in regard to the rejection of claims 6 and 7 based on Hibbs, the Examiner relies on Figure 1 (Prior Art derived from Starikov). It is clear from the discussion thereof that Hibbs (and Starikov) consider this to be a unitary test pattern rather than a plurality of sub-fields. However, even if the phrase "nine region design" is taken to suggest nine sub-fields, each sub-field would then have only a single line and a single space (or a single line filling the sub-field) and, more importantly, the plurality of such sub-fields would present only a single pitch of 0.4 microns since the center region is explicitly considered to be two lines of 0.4 microns width or a single line (e.g. a single feature) of 0.8 microns; either forming a featureless sub-field. Moreover, as noted in the paragraph bridging columns 3 and 4 of Hibbs et al., the "pitch is chosen to be below the resolution of a lithographic exposure tool used therewith so the lines appear to blur upon imaging. The line-to-space ratio varies across exposure monitor 10 so that the net effect is that of a single, broad, diffuse line with linearly varying optical intensity on each side of the center 16." This blurring is evidently essential to the function of the exposure monitor 10 since difficulties in developing needed line size and uniformity (e.g. below a pitch of 0.4 or 0.8 microns and even smaller line width dimensions) is noted as the resolution of lithographic exposure tools improves to ensure that the lines of the pattern are not, in fact, resolved and continue to result in a "single, broad, diffuse line with linearly varying optical intensity...". It is also to be noted that Hibbs et al. indicates the pattern of Figure 1 to have "a certain level of insensitivity to focus variations for broader lines, such as center line 16." Therefore,

it appears that the double width center line is also intended to be below the optical resolution of the tool (which, in any event, is not an image capture device, at least for the Starikov pattern). As a solution to this difficulty as tool resolution improves, Hibbs et al. proposes a pattern having featureless graduated grey scale areas so that no features (which might be resolved) are presented.

Thus, it is respectfully submitted that the pattern relied upon by the Examiner does not have a plurality of sub-fields and is limited to a single pitch but even if considered to have a plurality of sub-fields, each sub-field would have only a single feature (e.g. a line and a space or the boundary between them, each being thus incapable of causing a Moire' pattern or Moire' fringes) and presents only a single pitch (either singly or in combination) which must be below the resolution capability of the system (which also prevents causing Moire' fringes as well as failing to encompass the resolution of the image capture device, as claimed) in order to function as intended. In other words, while it is believed that a fair interpretation of Hibbs indicates that Hibbs does not teach a plurality of sub-fields, if Hibbs is interpreted to teach "a plurality of sub-fields" in Figure 1, the sub-fields do not each have a "plurality of features" nor do they present "a progression of image feature size and pitch" or a "progression" "encompassing the resolution of said imaging system" and, in any case, cannot produce Moire' fringes (by which resolution is determined by inspection, as recited in claims 6 and 7) consistent with the intended mode of operation disclosed by Hibbs/Starikov. Thus, Hibbs clearly does not anticipate the invention as recited in claims 6 and 7 and, in view of the precedent of *In re Gordon*, 221 USPQ 1125 (Fed. Circ., 1984), Hibbs cannot properly be modified to answer these claim

recitations, even in view of additional prior art, since the intended function would be necessarily precluded, as explicitly stated in the reference relied upon.

Similarly, Sussmeier teaches test targets for measuring dynamic range (Figure 2, relied upon by the Examiner) and contrast resolution (Figures 3 and 4 for respective coordinate directions) of an imaging device. Again, it is unclear how the Examiner considers Sussmeier to answer the recitation of the target presenting a plurality of sub-fields, as recited. Figure 2 consists of a plurality of repeated patterns of areas ("regions"), each of which presents a featureless area ("zone") of a given gray scale value. See column 5, line 53+. Further, Sussmeier explicitly states at column 5, lines 62 - 65, that the hatching applied to Figure 2 to indicate different gray scale values does not depict the appearance of the respective (gray scale) zones and thus the hatching of Figure 2 does not, in fact, teach or suggest features in sub-fields having a progression of size and pitch which encompasses the resolution of the imaging device, as claimed, and it is explicitly indicated in Sussmeier that it is not intended to do so. Further, Figures 3 and 4 show patterns of a constant pitch without any indication or suggestion of division into sub-fields, much less presenting the claimed optical features (e.g. a progression of pitch encompassing the resolution of the image capture device over a plurality of sub-fields). Further, to operate as intended to evaluate contrast resolution and distortion, the patterns of Figures 3 and 4 must "correspond to the minimum feature size that the preferred imaging device is expected to resolve" (column 6, lines 33 - 34, emphasis added) which assumes a *priori* knowledge of the resolution and would preclude the production of Moire' fringes, as well. Therefore, it is clear that the statement of the

rejection based on Sussmeier relies on an ambiguity in regard to identification of sub-fields and still fails to demonstrate how the claim recitations in regard to a progression of sizes and pitches encompassing the resolution of the imaging device are presented by respective sub-fields or even how any test pattern of Sussmeier could or would produce Moire' fringes consistent with operation in the intended manner.

Accordingly, it is respectfully submitted that the Examiner has not made a *prima facie* demonstration of anticipation of even claims 6 and 7 based upon Hibbs or Sussmeier and, particularly in view of the ambiguity in the statements of the respective grounds of rejection in regard to sub-fields, each having a plurality of features capable of causing Moire' fringes while failing to demonstrate how the sub-fields present a progression of feature size and pitch which encompasses the resolution of the imaging device, it is respectfully submitted that such a *prima facie* demonstration of anticipation (or obviousness) cannot be made based on these references taken singly or in combination.

In regard to the rejection of claims 8 - 12 based on Sussmeier in view of Neyman, The Examiner admits that Sussmeier does not teach or suggest the inclusion of indicia in the target and relies on Neyman for that teaching. However, it is respectfully submitted that quantitative information in the test image of Neyman relates to exposure information rather than resolution information while the remainder appear to be mere identifiers (e.g. "skin tone"). Moreover, as previously pointed out, The Examiner does not even suggest that Neyman provides and teaching or suggestion remotely supplemental to Sussmeier at the numerous points at which Sussmeier is deficient to answer the explicit recitations of the claims. Therefore, the Examiner has not made a *prima facie* demonstration of

obviousness of any of claims 8 - 12.

While the rejection based on Harshbarger, Jr., et al. (hereinafter "Harshbarger") is made under 35 U.S.C. §103, the Examiner admits that Harshbarger does not teach or suggest the principal function of the invention (allowing a quantitative determination of resolution to be made by image inspection) and continues to rely on Figure 4H to answer the claim recitations which support that function. Such reliance presents ambiguity in regard to the identification of sub-fields as in the respective application of Hibbs and Sussmeier, as discussed above. (In this regard, however, it is noted that column 10, lines 18 - 20, indicate that the patterns of Figures 4A - 4H may be used in combination in respective, equal display areas but does not teach or suggest that any particular test could be facilitated by evaluation of a combination of such patterns or modification of any such patterns for such a purpose but only that separate patterns for individual tests can be simultaneously displayed.) Thus it appears that the Examiner is interpreting Figure 4H as showing three or possibly four sub-fields (in which latter case, the two wider stripes would be single feature sub-fields and hence incapable of producing a Moire' fringe) but which do not present a progression of feature size and pitch but, rather, relatively more narrow stripes being at the left and right with wider stripes near the center, and clearly do not appear to encompass imaging device resolution (since all are wider than the "resolution test screen 4F having a single feature size and pitch) while there is no teaching or suggestion of any such modification in Harshbarger, particularly in regard to production of Moire' fringes or any other feature thereof which would support quantitative determination of resolution by simple image inspection, which the Examiner admits Harshbarger does not address. Therefore, it logically

follows that Harshbarger would not discuss features which would support a function which Harshbarger does not address and, in fact, Harshbarger merely names the type of test to which each of the test patterns 4A - 4J is directed without further comment. By the same token, the features of the respective patterns must be *within* the resolution capabilities of the imaging device or camera (rather than *encompassing* the resolution thereof, as claimed) in order for the imaging device to be capable of observing any image degradation in the display *as is evident from the numerous references in Harshbarger to the criticality of alignment and focus of the camera.*

Further, in regard to the admitted deficiency of Harshbarger to answer the recitations of the claims, the Examiner takes official notice "that it is well known in the art for an operator to inspect an image for image degradation". It is respectfully submitted that the taking of official notice in this case is improper since, for the taking of official notice to be proper, the information must be so *notoriously* well-known that evidence concerning that information is not needed. In this case, Harshbarger is largely directed to the provision of automated display evaluation apparatus (e.g. an EDDEA (columns 6 - 8), an AVDEA columns 10 - 12) and the like) to produce a go/no go determination of acceptable pattern rendering on the display *as an alternative to inspection and subjective determination of acceptability by an operator.* This arrangement is but an example of numerous fully automated inspection systems known in the art in which operator inspection (and subjective evaluation) is avoided. It is respectfully submitted that official notice cannot properly be taken contrary to the teachings of the reference the taking of official notice seeks to supplement. In any case, the information of which the Examiner takes official notice

is insufficient to answer the claim recitations since, even if an operator were to inspect an image, it does not necessarily follow that the information of interest would be observable, particularly where the reference is admittedly silent in regard to the *determination of resolution of the imaging device* while Harshbarger, in essence, is directed to determination of the image quality of the "target"; directly contrary to the function of the invention. Thus, it is respectfully submitted that the taking of official notice by the Examiner, at best, does not answer the recitations of claims 1 and 6 but, rather, is clearly an exercise in impermissible hindsight yielding, at best, a comment which is not probative of the issue of obviousness.

Moreover, the Examiner extends this exercise to the dependent claims by mere reference to the taking of official notice and thus clearly fails to make a *prima facie* demonstration of obviousness of any claim by a clear and logical line of reasoning. For example, in regard to claims 2 and 3, there is no indication in Harshbarger that a Moire' fringe or and gray area is produced, much less being of interest and capable of producing a quantitative determination of a performance parameter of an imaging device. As alluded to above, focus and alignment must be established *a priori* in Harshbarger to avoid production of the *image artifacts of interest* recited in claim 4. Therefore, it is respectfully submitted that the Examiner has not made a *prima facie* demonstration of obviousness of any of claims 1 - 7 based on Harshbarger.

In view of the foregoing, it is clearly seen that the Examiner has not, in fact, shown any teaching or suggestion in any of the prior art applied of a target having a plurality of sub-fields, each sub-field containing a plurality of features, and in which the plurality of sub-fields present a *progression of feature size and pitch* which *encompasses the resolution*

of an imaging device being evaluated, as recited in the claims. These recitations are entirely sufficient to support the production of Moire' fringes when the pitch of the features as projected onto the image plane of the imaging device does not match the pitch of image sensing areas in the imaging device and which thus supports the function of providing a quantitative determination of resolution of the imaging device by inspection of the image produced from the target image. It is abundantly evident that the Examiner glosses over these explicit claim recitations and asserts that they are answered by teachings which, in fact, are matters of ambiguous and self-contradictory evaluation by the Examiner and which are directly contrary to the actual teachings of the references, as is particularly evident from the Examiner's self-contradictory assertions that the feature pitches "encompass" the resolution of the imaging device when the pitch must be "below" the resolution limit (as in, for example, Hibbs) or must correspond to the resolution limits (as in, for example, Harshbarger or Sussmeier) and finding features in featureless sub-fields from hatching explicitly explained in Sussmeier as not depicting the actual appearance of the sub-fields; all evidently through impermissible hindsight. Similarly, the Examiner's responses to previously submitted arguments clearly confirm the hindsight-based confusion they seek to deny. For example, in regard to the feature pitch in Hibbs discussed above, the Examiner merely points out that lines of 0.4 and 0.8 microns pitch are presented but does not address the disclosure in Harshbarger that the 0.8 micron line is a doubled central line (e.g. continuing to reflect a 0.4 micron pitch and which is featureless) or, much more importantly, how this teaching, even if considered to reflect two pitches, answers the recitations of a progression of pitch which encompasses the resolution of the imaging device while

it is necessary to the intended mode of operation of Hibbs that none of these claim recitations are answered by Hibbs. Similarly, in regard to the calculation in Sussmeier, it is respectfully submitted that the calculation is, in fact, a calculation of *contrast* resolution (e.g. the amount of *contrast* developed in an image of highly contrasting but closely spaced lines) rather than a determination of *spatial* resolution, as is clearly evident from the reference to a "typical value" for the spatial frequency as well as that value being a small fractional number of bars per pixel. Accordingly, it is respectfully submitted that the various grounds of rejection asserted by the Examiner are all clearly in error and that no *prima facie* demonstration of the propriety of any asserted ground of rejection has been made. In fact, the Examiner asserts that the Applicant "conveniently ignores the rejection as a whole and picks some words and terms to argue his point" notwithstanding the fact that those words and terms are evidently the very claim recitations which clearly support the meritorious functions of the invention and which distinguish the invention from the prior art which is incapable of providing those meritorious functions. In other words, considering each ground of rejection as a whole, it is abundantly evident that each rejection is clearly in error due to the Examiner's failure to consider "words and terms" explicitly recited in the claims. Therefore, the Examiner has effectively admitted the very deficiencies of the references and the impropriety of each asserted ground of rejection discussed above. Accordingly, reconsideration and withdrawal of the stated grounds of rejection is respectfully requested.

It is also respectfully submitted that the finality of the present official action is premature. Clearly, it is improper for an action to be made final when no *prima facie* demonstration of the propriety of

any asserted ground of rejection is made therein (or, for that matter, in the previous official action). Therefore, it is respectfully requested that the finality of the present official action be withdrawn. In any case, it is respectfully submitted that entry of the above-requested amendments is well-justified as being non-substantive and limited to matters of form. Therefore, it is clear that the requested amendments cannot raise any new issues but, in fact, eliminate a possible issue and placing the application in condition for allowance or, in the alternative, improving form and reducing possible issues for Appeal.

Since all rejections, objections and requirements contained in the outstanding official action have been fully answered and shown to be in error and/or inapplicable to the present claims, it is respectfully submitted that reconsideration is now in order under the provisions of 37 C.F.R. §1.111(b). Upon such reconsideration, it is also respectfully submitted that this application is in condition for allowance and such action is therefore respectfully requested.

If an extension of time is required for this response to be considered as being timely filed, a conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041 (Whitham, Curtis & Christofferson).

Respectfully submitted,



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